

REMARKS

Claims 1-5 were pending and under consideration.

In the FINAL Office Action of May 20, 2003, Claims 1-5 were rejected.

In response, claim 1 has been amended. Claims 3-5 have been cancelled.

§ 102(e) Rejections:

Claims 1-5 are rejected under 35 U.S.C. § 102(e) as being anticipated by Negoro (US Patent No.: 6,232,021 B1) and Kihira et al. (US Patent No.: 6,316,147 B1) and Dahn et al. (US Patent No.: 6,168,887 B1). Applicant respectfully traverses these rejections.

The present invention provides a non-aqueous electrolyte cell in which the capacity is increased further by suppressing the structural changes of the positive electrode active material. It has been found that Li_xMnO_2 undergoes structural changes in the charging process (spinning) to lower the discharge capacity. On the other hand, $\text{Li}_x\text{Mn}_{1-y}\text{Al}_y\text{O}_2$ is much more stable thermodynamically than Li_xMnO_2 and is less susceptible to the possible structural changes. However, a solid solution of electrochemically inert Al has a small capacity. It has been determined that limiting the amount of solid solution of Al reduces the structural changes thereby increases capacity.

Claim 1 recites a non-aqueous electrolyte cell comprising: a positive electrode containing a lithium-transition metal compound oxide as a positive electrode active material; a negative electrode containing a carbon compound or metal lithium as a negative electrode active material; and a non-aqueous electrolyte interposed between said positive and negative electrodes; wherein said lithium-transition metal compound oxide is represented by the general formula $\text{Li}_x\text{Mn}_{1-y}\text{Al}_y\text{O}_2$ where $0.94 \leq x \leq 0.96$ and $0.06 \leq y \leq 0.25$ wherein said electrolyte is dissolved in a non-aqueous solvent and exists as a non-aqueous electrolyte and is selected from the group consisting of LiClO_4 , LiAsF_6 , LiPF_6 , LiBF_4 , $\text{LiB}(\text{C}_6\text{H}_5)_4$, $\text{CH}_3\text{SO}_3\text{Li}$, $\text{CF}_3\text{SO}_3\text{Li}$, LiCl and LiBr ; and wherein said solvent is selected from the group consisting of propylene carbonate, ethylene carbonate, dimethyl carbonate, 1,2-

dimethoxyethane, 1,2-diethoxyethane, γ -butyrolactone, 2-methyl tetrahydrofuran, 1, 3-dioxolane, 4-methyl-1, 3-dioxolan, 4-methyl-1, 3-dioxolan, diethyl ether, sulforane, methyl supforane, acetonitrile, propionitrile, anisole, acetic acid ester, lactic acid ester and propionic acid ester.

In contrast, Negoro, Kihira and Dahn generally disclose oxide sources to be Li_xMnO_2 . Negoro also discloses the positive electrode materials for use in the invention to include LiCoO , LiNiO , LiMnO , LiCoNiO , LiMnO and LiCoVO . Kihira lists LiMnO and LiMnO to be used in cathodes. Dahn discloses that $\text{Li}_x\text{Mn}_{1-y}\text{Al}_y\text{O}_2$ can be used for positive electrode materials. Dahn does not, however, teach that the electrolyte is dissolved in a non-aqueous solvent and exists as a non-aqueous electrolyte and is selected from the group consisting of LiClO_4 , LiAsF_6 , LiPF_6 , LiBF_4 , $\text{LiB}(\text{C}_6\text{H}_5)_4$, $\text{CH}_3\text{SO}_3\text{Li}$, $\text{CF}_3\text{SO}_3\text{Li}$, LiCl and LiBr , especially wherein the solvent is selected from the group consisting of propylene carbonate, ethylene carbonate, dimethyl carbonate, 1,2-dimethoxyethane, 1,2-diethoxyethane, γ -butyrolactone, 2-methyl tetrahydrofuran, 1, 3-dioxolane, 4-methyl-1, 3-dioxolan, 4-methyl-1, 3-dioxolan, diethyl ether, sulforane, methyl supforane, acetonitrile, propionitrile, anisole, acetic acid ester, lactic acid ester and propionic acid ester.

None of the cited references discloses nor suggests using $\text{Li}_x\text{Mn}_{1-y}\text{Al}_y\text{O}_2$ and the solvents used for dissolving the electrolyte above for the positive electrode. When a lithium-transition metal compound oxide represented by the general formula $\text{Li}_x\text{Mn}_{1-y}\text{Al}_y\text{O}_2$ and the solvent listed above is used, the thermal stability of the crystalline structure is improved and the discharging capacity is increased.

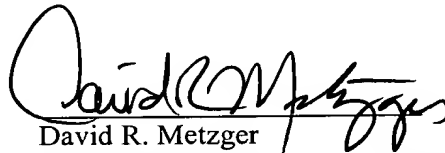
Accordingly, Applicant submits that the claimed invention is not anticipated by the cited references as suggested by the Examiner. Applicants respectfully submit these rejections have been overcome and request that they be withdrawn.

Claim 2 depends directly from claim 1 and is therefore allowable for at least the same reason that claim 1 is allowable.

In view of the foregoing, it is submitted that the pending claims 1-2 are patentable over the references cited by the Examiner. Further, all of the Examiner's objection and rejections have been addressed herein. It is, therefore, submitted that the application is in condition for allowance. Notice to that effect is respectfully requested.

Respectfully submitted,

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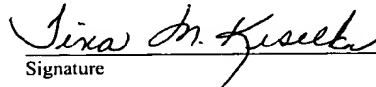


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